

## Lista de Exercícios

### Lista de Exercícios sobre Álgebra de Boole e simplificação de expressões lógicas

1 – Simplifique as seguintes expressões lógicas, utilizando a Álgebra de Boole:

a)  $S = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A.B.C$

Resp.:  $S = \bar{A}\bar{B}.\underbrace{(\bar{C} + C)}_1 + B.C.\underbrace{(\bar{A} + A)}_1 = \bar{A}\bar{B} + B.C = \overline{A+B} + B.C$

b)  $S = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + A\bar{B}C$

Resp.:  $S = \bar{A}\bar{B}.\underbrace{(\bar{C} + C)}_1 + A\bar{B}.\underbrace{(\bar{C} + C)}_1 = \bar{A}\bar{B} + A\bar{B} = \bar{B}.\underbrace{(\bar{A} + A)}_1 = \bar{B}$

c)  $S = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C} + A\bar{B}C + A.B.C$

Resp.:  $S = \bar{B} + A.C$

d)  $S = A.B.C + \bar{A}.B.C + A.\bar{B}.\bar{C} + \bar{A}.\bar{B}.\bar{C} + A.\bar{B}.C + A.B.\bar{C}$

Resp.:  $S = A + B$

e)  $S = \bar{A}\bar{B}.C + A.B.(A.B.C + A.\bar{B}.C + C)$

Resp.:  $S = \bar{A}\bar{B}.C + A.B.\underbrace{(A.B.C + A.\bar{B}.C + C)}_C = \bar{A}\bar{B}.C + A.B.C = C.(\bar{A}\bar{B} + A.B) = C.\overline{A \oplus B}$

f)  $S = (A + \bar{B} + C).(A + \bar{B} + \bar{C}).(\bar{A} + \bar{B} + C)$

Resp.:  $S = (\underbrace{A.A}_A + A.\bar{B} + A.\bar{C} + A.\bar{B} + \underbrace{\bar{B}.\bar{B}}_{\bar{B}} + \bar{B}.\bar{C} + A.C + C.\bar{B} + \underbrace{C.\bar{C}}_0).(\bar{A} + \bar{B} + C)$

$S = (\underbrace{A + A.\bar{B} + A.\bar{C} + A.\bar{B} + A.C}_A + \underbrace{\bar{B} + \bar{B}.\bar{C} + C.\bar{B}}_{\bar{B}}).(\bar{A} + \bar{B} + C) = (A + \bar{B}).(\bar{A} + \bar{B} + C)$

$S = \underbrace{A.\bar{A}}_0 + A.\bar{B} + A.C + \bar{A}.\bar{B} + \underbrace{\bar{B}.\bar{B}}_{\bar{B}} + \bar{B}.C = \bar{B} + \underbrace{A.\bar{B} + \bar{A}.\bar{B} + \bar{B}.C}_{\bar{B}} + A.C = \bar{B} + A.C$

g)  $S = \overline{(A + \bar{B}.(A + B))}.(\bar{A} + \bar{B})$

$$\text{Resp.: } S = \overline{(\underbrace{A + A\bar{B}}_A + \underbrace{B\bar{B}}_0)(\bar{A} + \bar{B})} = \overline{A(\bar{A} + \bar{B})} = \overline{\underbrace{A\bar{A}}_0 + A\bar{B}} = \overline{A\bar{B}} = \bar{A} + B$$

$$\text{h) } S = (A \oplus B)\bar{B} + \bar{A}C + \overline{A + C}$$

$$\text{Resp.: } S = (\bar{A}B + A\bar{B})\bar{B} + \bar{A}C + \bar{A}\bar{C} = \bar{A}\underbrace{B\bar{B}}_0 + A\underbrace{\bar{B}\bar{B}}_B + \bar{A}(\underbrace{C + \bar{C}}_1) = A\bar{B} + \bar{A} = \bar{A} + \bar{B} = \overline{A\bar{B}}$$

$$\text{i) } S = \overline{A \oplus B + C} + A\bar{B}C + A\bar{B}\bar{C}$$

$$\text{Resp.: } S = \overline{A \oplus B}C + A\bar{B}C + A\bar{B}(\bar{B} + \bar{C}) = (\bar{A}\bar{B} + A\bar{B})C + A\bar{B}C + A\bar{B}\underbrace{\bar{B}}_0 + A\bar{B}\bar{C}$$

$$S = \bar{A}\bar{B}C + A\bar{B}C + A\bar{B}C + A\bar{B}\bar{C} = \bar{B}C(\underbrace{\bar{A} + A}_1) + A\bar{B}(\underbrace{C + \bar{C}}_1) = \bar{B}C + A\bar{B}$$

$$\text{j) } S = \overline{(\bar{A} + B + \bar{C}D)(\bar{A}B\bar{C} + \bar{C}D) + \bar{B}\bar{C}}$$

$$\text{Resp.: } S = A + B$$

$$\text{k) } S = \overline{(\bar{A} + B + \bar{D})(\bar{A}B\bar{C} + C) + A\bar{B} + (B + \bar{C})}$$

$$\text{Resp.: } S = A.D(\bar{B} + \bar{C})$$